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### 1 [Efficient adaptive meshing of parametric models](#)



Alla Sheffer, Alper Üngör

 May 2001 **Proceedings of the sixth ACM symposium on Solid modeling and applications**

Publisher: ACM Press

Full text available: [pdf\(1.45 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Parametric modeling is becoming the representation of choice for most modern solid modelers. However, when generating the finite-element mesh of the model for simulation and analysis, most meshing tools ignore the parametric information and use only the boundary representation of the model for meshing. This results in re-meshing the model basically from scratch each time a parametric change is instantiated, which happens numerous times throughout the design process.

In this paper we l ...

**Keywords:** adaptivity, mesh generation, parametric models

### 2 [Improving the surface cycle structure for hexahedral mesh generation](#)



Matthias Müller-Hannemann

 May 2000 **Proceedings of the sixteenth annual symposium on Computational geometry**

Publisher: ACM Press

Full text available: [pdf\(1.27 MB\)](#)Additional Information: [full citation](#), [references](#), [index terms](#)

### 3 [Level set and PDE methods for computer graphics](#)



David Breen, Ron Fedkiw, Ken Museth, Stanley Osher, Guillermo Sapiro, Ross Whitaker

 August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

Publisher: ACM Press

Full text available: [pdf\(17.07 MB\)](#)Additional Information: [full citation](#), [abstract](#)

Level set methods, an important class of partial differential equation (PDE) methods, define dynamic surfaces implicitly as the level set (iso-surface) of a sampled, evolving nD function. The course begins with preparatory material that introduces the concept of using

partial differential equations to solve problems in computer graphics, geometric modeling and computer vision. This will include the structure and behavior of several different types of differential equations, e.g. the level set eq ...

#### 4 The elements of nature: interactive and realistic techniques



Oliver Deussen, David S. Ebert, Ron Fedkiw, F. Kenton Musgrave, Przemyslaw Prusinkiewicz, Doug Roble, Jos Stam, Jerry Tessendorf

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available: pdf(17.65 MB) Additional Information: [full citation](#), [abstract](#)

This updated course on simulating natural phenomena will cover the latest research and production techniques for simulating most of the elements of nature. The presenters will provide movie production, interactive simulation, and research perspectives on the difficult task of photorealistic modeling, rendering, and animation of natural phenomena. The course offers a nice balance of the latest interactive graphics hardware-based simulation techniques and the latest physics-based simulation techni ...

#### 5 Facial modeling and animation



Jörg Haber, Demetri Terzopoulos

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available: pdf(18.15 MB) Additional Information: [full citation](#), [abstract](#)

In this course we present an overview of the concepts and current techniques in facial modeling and animation. We introduce this research area by its history and applications. As a necessary prerequisite for facial modeling, data acquisition is discussed in detail. We describe basic concepts of facial animation and present different approaches including parametric models, performance-, physics-, and learning-based methods. State-of-the-art techniques such as muscle-based facial animation, mass-s ...

#### 6 Collision detection and proximity queries



Sunil Hadap, Dave Eberle, Pascal Volino, Ming C. Lin, Stephane Redon, Christer Ericson

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available: pdf(11.22 MB) Additional Information: [full citation](#), [abstract](#)

This course will primarily cover widely accepted and proved methodologies in collision detection. In addition more advanced or recent topics such as continuous collision detection, ADFs, and using graphics hardware will be introduced. When appropriate the methods discussed will be tied to familiar applications such as rigid body and cloth simulation, and will be compared. The course is a good overview for those developing applications in physically based modeling, VR, haptics, and robotics.

#### 7 Physical modeling with B-spline surfaces for interactive design and animation



Jeffrey A. Thingvold, Elaine Cohen

February 1990 **ACM SIGGRAPH Computer Graphics , Proceedings of the 1990 symposium on Interactive 3D graphics SI3D '90**, Volume 24 Issue 2

**Publisher:** ACM Press

Full text available: pdf(936.56 KB) Additional Information: [full citation](#), [abstract](#), [citings](#), [index terms](#)

Physically based modeling has recently become a subject of widespread interest. This paper defines a model of elastic and plastic B-spline surfaces which supports both animation and design operations, including the interference detection, within the

"Elastics"/Alpha\_1 modeling environment. We develop "refinement" operations for spring and hinge B-spline models which are compatible with the physics and the mathematics of B-spline models, including refinement. It is also a step towards a more con ...

### 8 Three dimensional threaded fastener meshing algorithm



Paul Kinney, Dave Strenski

May 2001 **Proceedings of the sixth ACM symposium on Solid modeling and applications**

**Publisher:** ACM Press

Full text available: pdf(1.41 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Understanding the stresses in the root of a thread of a bolt has never been easy. Ideally one would like to put a strain gage right at the root and measure them directly, but the placement of the gage and its wires are impossible without changing the insitu environment. Engineers then turned to analytical models, but soon discovered that two dimensional models where not giving the correct results because the geometry is not axis symmetric and three dimensional models where too difficult to me ...

**Keywords:** bolt, solid meshing, threaded fastener

### 9 Projectors: advanced graphics and vision techniques



Ramesh Raskar

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available: pdf(6.53 MB) Additional Information: [full citation](#)

### 10 Skeleton-based modeling operations on solids



Duane W. Storti, George M. Turkiyyah, Mark A. Ganter, Chek T. Lim, Derek M. Stal

May 1997 **Proceedings of the fourth ACM symposium on Solid modeling and applications**

**Publisher:** ACM Press

Full text available: pdf(2.02 MB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

### 11 Bicubic subdivision-surface wavelets for large-scale isosurface representation and visualization



Martin Bertram, Mark A. Duchaineau, Bernd Hamann, Kenneth I. Joy

October 2000 **Proceedings of the conference on Visualization '00**

**Publisher:** IEEE Computer Society Press

Full text available: pdf(3.17 MB) Additional Information: [full citation](#), [citations](#), [index terms](#)

**Keywords:** compression algorithms, geometric modeling, iso-surface, multiresolution method, wavelets

### 12 Layered tetrahedral meshing of thin-walled solids for plastic injection molding FEM



Soji Yamakawa, Charles Shaw, Kenji Shimada

June 2005 **Proceedings of the 2005 ACM symposium on Solid and physical modeling**

**Publisher:** ACM Press

Full text available:  [pdf\(1.04 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper describes a method for creating a well-shaped, layered tetrahedral mesh of a thin-walled solid by adapting the surface triangle sizes to the estimated wall thickness. The primary target application of the method is the finite element analysis of plastic injection molding, in which a layered mesh improves the accuracy of the solution. The edge lengths of the surface triangles must be proportional to the thickness of the domain to create well-shaped tetrahedrons; when the edge lengths a ...

**Keywords:** finite element method, plastic injection molding, tetrahedral mesh

### 13 Compatible Triangulations of Spatial Decompositions

William J. Schroeder, Berk Geveci, Mathieu Malaterre

October 2004 **Proceedings of the conference on Visualization '04**

**Publisher:** IEEE Computer Society

Full text available:  [pdf\(268.01 KB\)](#) Additional Information: [full citation](#), [abstract](#)

We describe a general algorithm to produce compatible 3D triangulations from spatial decompositions. Such triangulations match edges and faces across spatial cell boundaries, solving several problems in graphics and visualization including the crack problem found in adaptive isosurface generation, triangulation of arbitrary grids (including unstructured grids), clipping, and the interval tetrahedrization problem. The algorithm produces compatible triangulations on a cell-by-cell basis, using a m ...

**Keywords:** triangulation, tetrahedrization, adaptive grid, clipping, contouring, template, Delaunay, parallel

### 14 Large steps in cloth simulation



David Baraff, Andrew Witkin

July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**

**Publisher:** ACM Press

Full text available:  [pdf\(465.12 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** cloth, constraints, implicit integration, physically-based modeling, simulation

### 15 Real-time shadowing techniques



Tomas Akenine-Moeller, Eric Chan, Wolfgang Heidrich, Jan Kautz, Mark Kilgard, Marc Stamminger

August 2004 **Proceedings of the conference on SIGGRAPH 2004 course notes GRAPH '04**

**Publisher:** ACM Press

Full text available:  [pdf\(11.17 MB\)](#) Additional Information: [full citation](#), [abstract](#)

Shadows heighten realism and provide important visual cues about the spatial relationships between objects. But integration of robust shadow shadowing techniques in real-time rendering is not an easy task. In this course on how shadows are incorporated in real-time rendering, attendees learn basic shadowing techniques and more advanced techniques that exploit new features of graphics hardware. The course begins with shadowing techniques using shadow maps. After an introduction to shadow maps and ...

### 16 Automatic restoration of polygon models



Stephan Bischoff, Darko Pavic, Leif Kobbelt

October 2005 **ACM Transactions on Graphics (TOG)**, Volume 24 Issue 4**Publisher:** ACM PressFull text available: [pdf\(21.66 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a fully automatic technique which converts an inconsistent input mesh into an output mesh that is guaranteed to be a clean and consistent mesh representing the closed manifold surface of a solid object. The algorithm removes all typical mesh artifacts such as degenerate triangles, incompatible face orientation, non-manifold vertices and edges, overlapping and penetrating polygons, internal redundant geometry, as well as gaps and holes up to a user-defined maximum size  $\rho$ . Moreover, ...

**Keywords:** Mesh repair, polygon meshes, surface extraction, voxelization

## 17 A Computational Database System for Generating Unstructured Hexahedral Meshes with Billions of Elements

Tiankai Tu, David R. O'Hallaron

November 2004 **Proceedings of the 2004 ACM/IEEE conference on Supercomputing****Publisher:** IEEE Computer SocietyFull text available: [pdf\(222.13 KB\)](#) Additional Information: [full citation](#), [abstract](#)

For a large class of physical simulations with relatively simple geometries, unstructured octree-based hexahedral meshes provide a good compromise between adaptivity and simplicity. However, generating unstructured hexahedral meshes with over 1 billion elements remains a challenging task. We propose a database approach to solve this problem. Instead of merely storing generated meshes into conventional databases, we have developed a new kind of software system called Computational Database System ...

## 18 Texture mapping 3D models of real-world scenes



Frederick M. Weinhaus, Venkat Devarajan

December 1997 **ACM Computing Surveys (CSUR)**, Volume 29 Issue 4**Publisher:** ACM PressFull text available: [pdf\(1.98 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#), [review](#)

Texture mapping has become a popular tool in the computer graphics industry in the last few years because it is an easy way to achieve a high degree of realism in computer-generated imagery with very little effort. Over the last decade, texture-mapping techniques have advanced to the point where it is possible to generate real-time perspective simulations of real-world areas by texture mapping every object surface with texture from photographic images of these real-world areas. The technique ...

**Keywords:** anti-aliasing, height field, homogeneous coordinates, image perspective transformation, image warping, multiresolution data, perspective projection, polygons, ray tracing, real-time scene generation, rectification, registration, texture mapping, visual simulators, voxels

## 19 Accurate computation of the medial axis of a polyhedron



Tim Culver, John Keyser, Dinesh Manocha

June 1999 **Proceedings of the fifth ACM symposium on Solid modeling and applications****Publisher:** ACM PressFull text available: [pdf\(1.59 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

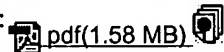
20 Tracking scalar features in unstructured datasets

Deborah Silver, Xin Wang

October 1998 **Proceedings of the conference on Visualization '98**

**Publisher:** IEEE Computer Society Press

Full text available:



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**Keywords:** CFD, computer vision, feature tracking, scientific visualization, time-varying, visualization

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